

***Interactive comment on “A classification scheme to determine wildfires from the satellite record in the cool grasslands of southern Canada: considerations for fire occurrence modelling and warning criteria” by Dan K. Thompson and Kimberly Morrison***

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Reviewer 2: Overall, I think this paper is trying to advance natural hazards - specifically fire science - in using remote sensing and data science to attribute and predict wildland vs. human caused fire. I would recommend the authors refine the terminology. I look forward to reading a revised version.

General comments: 1. Landsat 8 is not an acronym and should not be capitalised.

»>Fixed as suggested.

Referring to all non-wildland fires as agricultural fires becomes confusing later on, especially when trying to explain how the curing data set was included in the regression tree [much of the agricultural landscape was exempted from the curing assessment because < 40% open fuels]. »> We now clarify in the methods that the trees are uncommon in the region outside of shelterbelts: “Within the agricultural ecumene, the vast majority of the region constitutes open fuels (Figure 1), and little tree cover exists outside of shelter belt plantations which exist as single rows of trees (Piwowar et al., 2016). “

The term ‘responsible use of fire’ is used to encompass a large amount of human-caused burning. Is this a legal or statute-based definition? This is not a common term in fire science. Also, burning of crop residues is not necessarily considered an appropriate thing for this ecosystem. The Province of Alberta has shifted to no-burn management of crop residues, treating burning as a last resort: <https://open.alberta.ca/dataset/dd5ca66a-09f6-4aeb-8bb9-21babad92780/resource/3b67de8e-7377-406c-94d7-25f3efaae710/download/mar2017-unharvested-crops-fs.pdf> » We adopt a terminology similar to Lewis et al 2018, where “use of fire” is specific to the low-intensity application of fire in an informal context by community members, not in a formal prescribed fire context. This isn’t a definition based on legal statute. As we discuss later in the paper, burning of post-harvest flax residue may be in part responsible for higher fire activity in the eastern portion of our study region.

Why was 2002 (Terra only) MODIS active fire product included when the combined (Aqua and Terra) MODIS active fire product is available starting in 2003? How were these differences in number of detections accounted for when determining the clusters? Was the 2002 Terra-only MODIS active fire useful? »> Only 3 of 140 hotspot clusters were from 2002, so we did not go to the effort of normalizing the lower detection rate of having only one MODIS instrument. For the density analysis across the

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landscape, since we had autumn 2002 included and the density data in Figure 6 is an average over the 2002-2018 period, we similarly did not normalize for such a small effect.

Paragraph 265: The thesis statement of this paragraph may need to be re-written “ The thresholds at which agricultural fire detections are overtaken by wildfires occurs at fire intensity thresholds that correspond to the limits of ground-based wildfire suppression.” Is this a result or a qualitative observation or an assumption that fits into the description of the CFFDRS is the following sentence? Please consider re-phrasing this paragraph.  
» Rephrased to: “The thresholds shown here in the classification tree and GAM models correspond to modelled fire intensity conditions at the upper limits of ground-based wildfire suppression.”

I do not understand how this fits into the study or the findings. Perhaps, again, it is an issue with referring to grass fires as agricultural fires. This reads as the CFFDRS for native grasslands. Is that correct? »> We now clarify the relationship between agricultural debris and fire behaviour models in Canada: “The grass fire spread model in the Canadian Forest Fire Danger Rating System utilizes Australian experimental grass fire data that has been shown to approximate fire behaviour in wheat crops, with the matted (or cut) grass model approximating spring (cured) post-harvest debris (Cruz et al., 2020).”

Is the last paragraph in the discussion section implying increasing agricultural fires with climate change? Did this study find increasing agricultural fires? And if so, in grasslands or croplands? »> We now clarify that there has been no observed trends in fire activity in the region, though wildfire activity is expected to increase in the surrounding forest regions: “In addition to this likely grassland and cropland expansion, projections of increasingly common critical fire weather conditions (Wang et al., 2015) is likely to shift the fire regime to one of more open fuel burning. However, no change in the rate of fire detections (undifferentiated between wildfires and agricultural burning) has been detected between 1981-2000(Riaño et al., 2007) nor 1998-2015 (Andela et al., 2017).”

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